

# POINTS AND ANGLES

Newsletter of the Metropolitan  
Mathematics Club of Chicago

NCTM  
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Metropolitan  
Mathematics  
Club of  
Chicago



Volume XL

November 2005

No. 3

## Using Simulation to Learn and Do Statistics

Allan Rossman

By RICH RUKIN

Computer intensive methods are gaining popularity in statistical analysis, enabling more complex analyses than what could be accomplished with model-based approaches. The power of simulations can also greatly aid in helping students understand the underlying concepts of sampling distributions, significance, and confidence. This talk will provide brief examples of using tools such as randomization distributions and bootstrapping to help students learn and do statistics.

Allan J. Rossman (replacing Beth Chance on the schedule) is currently Professor of Statistics at Cal Poly- San Luis Obispo. He has been at Cal Poly since 2001, having previously taught for twelve years at Dickinson College in Pennsylvania. His undergraduate degree is from Geneva College, and he earned a Ph.D. in Statistics from Carnegie Mellon University. His professional interests center on developing curricular materials for teaching and learning introductory statistics, including *Workshop Statistics* and *Investigating Statistical Concepts, Applications, and Methods*. He is President-Elect of the International Association for Statistics Education and has chaired the ASA's Section on Statistical Education and the ASA/MAA Joint Committee on Undergraduate Statistics. He was elected a Fellow of the American Statistical Association in 2001.

REMEMBER!! You can earn CPDU credits for attending dinner meetings!

Date: Friday, November 18, 2005

Time: 5:30 p.m. Doors Open

6:00 p.m. Social Hour

7:00 p.m. Dinner and Talk

Place: Fountain Blue Banquets &  
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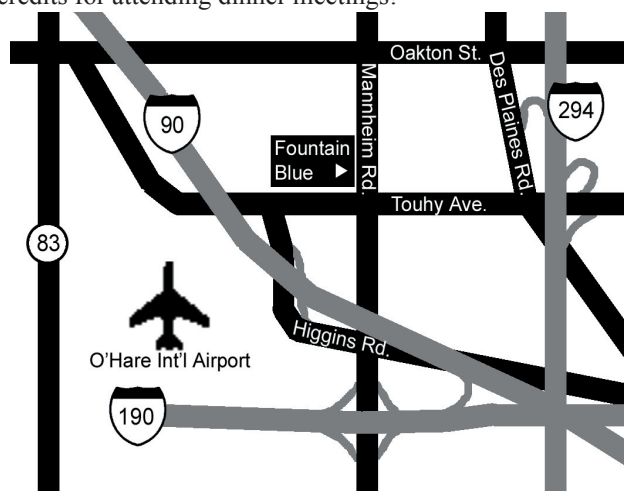
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Call Evanston Math Department at

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Requests for special meals must be made  
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### INSIDE...

Points from the Interior . . . . .	2
October Talk Summary . . . . .	3
November Problems . . . . .	4
NCTM Regional Meeting . . . . .	5

## Points from the Interior

BY JOHN DIEHL

I hope you enjoyed the October talk on Statistical Literacy by Gail Burill. Please see the summary of the talk in this newsletter. We do have another statistics talk for our November meeting. I know it is unusual to have similar topics, especially back to back. However, I believe the specific topics are quite different and both are very important. Gail has helped us to see the big picture of statistics education, our next talk will focus on a specific topic, simulation.

Beth Chance was originally scheduled for November, however, she will be replaced by her co-author Allan Rossman. Beth and Allan have written the *Workshop Statistics* books. Allan's presentation on simulation

will open our eyes to the world of probability and statistics. Hope to see you on November 18!

As a teacher of AP statistics, I am very glad that both of these fine speakers were available to MMC. I have recently been reading *The Lady Tasting Tea, How Statistics Revolutionized Science in the Twentieth Century*, by David Salsburg. One of the fascinating aspects of the book is that the developments it describes are recent as the title suggests. I think statistics differs dramatically from, say, geometry, in this regard. I compiled a quick list of some of the most famous statisticians, along with their birth and death dates:

Karl Pearson 1857-1936  
 William Gossett 1876- 1937  
 Paul Levy 1886-1971  
 Ronald Fisher 1890-1962  
 Frank Wilcoxon 1892-1965  
 Jerzy Neyman 1894-1981  
 Egon Pearson 1895-1980  
 W. Edwards Deming 1900-1993  
 Andre Kolmogorov 1903-1987  
 Samuel Wilks 1906-1964  
 William Cochran 1909-1980  
 John Tukey 1915-2000

It was interesting to me that 10 of the 12 had lives overlapping mine, and 3 overlapping the lives of some of my students.

I hope that we, in all of our mathematics and statistics classes, talk about the history of our subjects, describing who, what, where, and when for the theorems, algorithms, and symbols we use. In particular, I believe that statistics gives us a great opportunity to mention very recent persons and developments.

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## The Changing Face of Math Literacy: Statistics

BY GWEN ZIMMERMANN

Given all that is happening in mathematics education today, Gail Burrill challenged us to step back and see what is really happening. Are we teaching students the skills they will need to make sense of today's world? Displaying a population pyramid for the Netherlands, Gail invited the audience to identify the aging problem in the Netherlands. The population pyramid was part of a unit on statistics designed in the Netherlands that Gail and a group of U.S. teachers were asked to teach. An analysis of the population pyramid was to be the assessment. As Gail explained, some of the teachers in the group argued against the use of this graph as the students had never seen such a graph before. Yet one teacher argued that if as teachers we equip students with the necessary skills, students should be able to make sense of data and graphs such as the population pyramid.

Gail shared how "doing" mathematics requires us to define a mathematical problem, and then generalize the problem using numbers and abstractions to come up with a solution. Doing statistics involves variability and context. "The real value of statistical methodology lies in its usefulness in solving a problem of interest, not in any generalizable properties that can be proved theoretically. (Scheaffer, 2006)"

Trend data shows that enrollment in calculus has decreased at both 4 year and 2 years colleges and universities. At the same time, enrollment in statistics courses had increased. Additionally, the total number of AP exams in both calculus and statistics continues to grow. At Michigan State University, many programs require some type of statistics course to complete the program (ranging from anthropology to agriculture to occupational therapy). Often the statistics course shows up as some other course name and not necessarily taught in the statistics or mathematics department

So why should students study mathematics and statistical literacy? Ordinary people need to "make sense of stuff that shows up." People need to be able to make sense of what they read in the newspaper. Gail shared several examples taken directly from the newspaper and discussed the need for statistical literacy. Some of these examples included a line graph from USA Today illustrating the effect of inflation on

retirement funds. Another graph showed how the quality of cars is improving. A newspaper article about bacterial E coli provided data to suggest that a problem may exist in administering antibiotics to children to combat bacterial E coli – assuming one has the necessary skills to make sense of the data. Data and problem solving are a way to get along in the world. It also helps to prepare people for the world of work.

Through her work at Michigan State University, Gail has found that most teachers cannot read the graphs. Gail displayed a graph showing student achievement on some test items. Teachers are not able to make sense of the graph thus they are not able to make informed decisions of instruction.

According to Gail, "We don't give kids kinds of problems they will confront in the world." Students need to struggle with concepts before hearing a lecture that helps bring ideas together. Gail challenged us to determine if one could make a fair spinner by dividing a triangle into 3 parts. Some audience members suggested that the triangle must be equilateral. Others suggested that the centroid of any triangle could be used. (I won't give away the answer.) Gail informed us that this was a 6th grade question. Another example of a problem that could be given to students to struggle with was another example of a population pyramid. The task was to determine the event given the distribution of ages by gender.

Problems such as these provide students with an opportunity to think and interpret these types of graphs. If teachers illustrate to students connections between concepts and representations students have greater success. Mathematics involves representing a mathematical concept concretely. Statistics is about concept and variability and trying to make decisions. We need to start bringing the two together.

Mathematics/statistics involves formulating, modeling, and solving problems. It means knowing the right questions to ask. These are skills employers value. So "how do we decide what mathematics to do? How do we bridge the two worlds-prepare for the new one while living in the old? How do we convince those who make the decisions that the times are different?" Start from what is important and backmap the mathematics. Teach students the Polya way, and they will be able to do both mathematics and statistics.





## NCTM Central Regional Conference

Experience the Winds of Change  
 in  
 Mathematics Education!

Chicago, Illinois  
 September 20-September 22, 2006  
 (Wednesday, Thursday, Friday)

- Featuring a CAS (Computer Algebra Systems) Strand
- Located at the Hyatt Regency McCormick Place
- This will take the place of the 2006 ICTM Conference

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## NOTICES & REMINDERS

MEECAS Upcoming Meetings  
Saturdays  
9 a.m. to 12 noon  
Continental Breakfast provided

\* December 3, 2005 "Proof and CAS"  
Glenbrook South High School  
4000 W. Lake Avenue, Glenview, IL 60026

For questions, more information, or to RSVP,  
contact Michelle Kolet at 847-755-4600 or [mkolet@d211.org](mailto:mkolet@d211.org)

MEECAS is a consortium for mathematics educators who are exploring, or are interested in exploring, the use of computer algebra systems (CAS) in mathematics classrooms.

<http://gbs.glenbrook.k12.il.us/Academics/gbsmat/meecas/home.htm>

WE NEED YOU! VOLUNTEER!!

Volunteer to help at the NCTM Regional Meeting  
in Chicago September 20-22, 2006

It takes great people like you to make the conference  
a success! Contact either Gwen Zimmermann  
([gzimmerm@hinsdale86.org](mailto:gzimmerm@hinsdale86.org)) or Laura DiMarco  
([ldimarco@hinsdale86.org](mailto:ldimarco@hinsdale86.org)) for more information.  
(or phone 630.570.8421)

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Old issues of POINTS AND ANGLES, summaries of talks given  
at MMC meetings, the MMC Scholarship application,  
job openings and people looking for jobs, and more!

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no later than the date of the MMC meeting preceding the issue in which you would like it to appear. All notices are subject to editing.

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